Exploring the Roots of a Massive Volcanic Eruption - Geochemical Comparison of Intrusive Rocks and Overlying Volcanic Rocks

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Understanding the relationship between magma chambers and erupted volcanic rocks will aid us in understanding the growth and evolution of magma bodies that are capable of producing violent, destructive volcanic eruptions. These eruptions can cause human health and safety hazards, environmental and municipal damage and in some cases deaths. Through geochemical analysis, I am studying the Woods Lake mass of the Palisade Crest Intrusive Suite, an exhumed magma chamber, to evaluate the relationship to the overlying volcanic rocks hypothesized to have erupted from this magma chamber. Rock samples from the intrusive suite were powdered and geochemically analyzed by x-ray fluorescence spectroscopy, precision and accuracy have been estimated based on rock standards, and statistical analysis is used to test the homogeneity of the magma chamber. Major element data show my hypothesis that the magma chamber was homogeneous in chemical composition was incorrect. The results show real trends of variance in composition. The silicon dioxide abundance exceeds any other element, and when compared to the specific gravity of the samples there is a negatively correlated trend relating higher specific gravity to lower silica content. The variance in chemical abundances geographically show mechanisms of differentiation were in process during the evolution of the magma chamber with minerals that have higher crystallization temperature forming first. Furthermore, the northern Tinemaha pluton that is believed to be related to the Woods Lake mass is not chemically identical to the Woods Lake mass. Further chemical analysis of high charge and rare earth element data are in progress to test the relationship between the Woods Lake mass and the more silica-rich overlying volcanic rocks. This research will contribute to the understanding of how large, eruptible magma chambers grow and evolve.

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